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Supporting the use of learning objects in the K-12 environment

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Supporting the use of Learning Objects in the K-12 Environment

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DECLARATION

I, Wayne Cotton, declare that this thesis is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Signed: _____

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I dedicate this work to my father, Graeme William Cotton (1947-1984) and grandparents Olwyn (1923-2004) and Bill Cotton (1924 – 2007) who between them taught me to believe in myself, and to strive for success.

ABSTRACT

In recent years there has been an international agenda to make electronic resources, in the form of learning objects, freely available to teachers and students via on-line databases or repositories. To date, much of the work on these resources has focused on the development of learning objects and the technical aspects of the storage and retrieval processes. Less attention has been paid to the way the learning objects are disseminated and how teachers incorporate the objects into teaching and learning activities. Several researchers (Bennett, Lockyer, & Agostinho, 2004; Hand et al., 2004; Kang, Lim, & Kim, 2003; Koper, 2001b; Laurillard & McAndrew, 2003; Lukasiak et al., 2004; Wiley, 2003) suggest that using generic pedagogical frameworks, known as learning designs, may support teachers who wish to make use of these learning objects. This research study sought out to investigate these claims by designing, developing and evaluating a support system to aid K-12 teachers as they attempt to incorporate learning objects into learning designs.

The theories underlying this support system approach are linked to Vygotsky's (1978) concept of the zone of proximal development and the notion of scaffolding to assist a learners in making progress on tasks that would otherwise be out of their reach (Davis & Linn, 2000; Edelson, Gordin, & Pea, 1999; Quintana, Eng, Carra, Wu, & Soloway, 1999; Reiser, 2002). Using these ideas as a base it was theorised that a cognitive tool in the form of an Electronic Performance Support System (EPSS) could provide the necessary scaffolding to aid teachers through the process of integrating learning objects within pedagogically effective frameworks (i.e., learning designs). The specific learning design used in this study was a WebQuest. This framework was selected because WebQuests are widely known within the K-12 community (Dodge, 1995) and because WebQuests require the use of online resources (i.e., learning objects).

To investigate the integration of learning objects within a learning design, a research approach that could encompass the design, development and evaluative nature of the study was needed. One such approach that has been proven to solve similar broad based, complex, real world problems, while at the same time maintaining a commitment

to theory construction and explanation, is Reeves' development research model (Reeves, 2000; Reeves, Herrington, & Oliver, 2004).

Using the development research procedures outlined by Reeves, this study initially involved a needs analysis to identify the issues that K-12 teachers faced when they attempted to incorporate learning objects within a specific learning design. Considering the findings from the needs analysis with current peer reviewed literature, a series of design principles were generated. These principles were then used to inform the design, development and testing of a web-based EPSS.

The findings of the study suggest that when K-12 teachers attempt to incorporate learning objects within a learning design they face issues in four main areas: 1) limitations in their own technological competency when developing WebQuests; 2) issues relating to how teachers manage the time available to create WebQuests; 3) difficulties in searching for and identifying appropriate learning objects; and 4) maintaining the pedagogical quality within the learning designs.

The web-based EPSS developed in this study addressed these issues by supporting the teachers as they incorporated learning designs into their teaching and learning experiences. The EPSS accomplished this by combining specific information, guidance, online tutorials, and a range of pedagogically effective learning design taxonomies into an all encompassing support structure. The study revealed that there are still more opportunities to develop the support system further, particular in relation to managing the time taken to develop WebQuests and to maintaining the pedagogical quality of the teaching and learning experience.

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